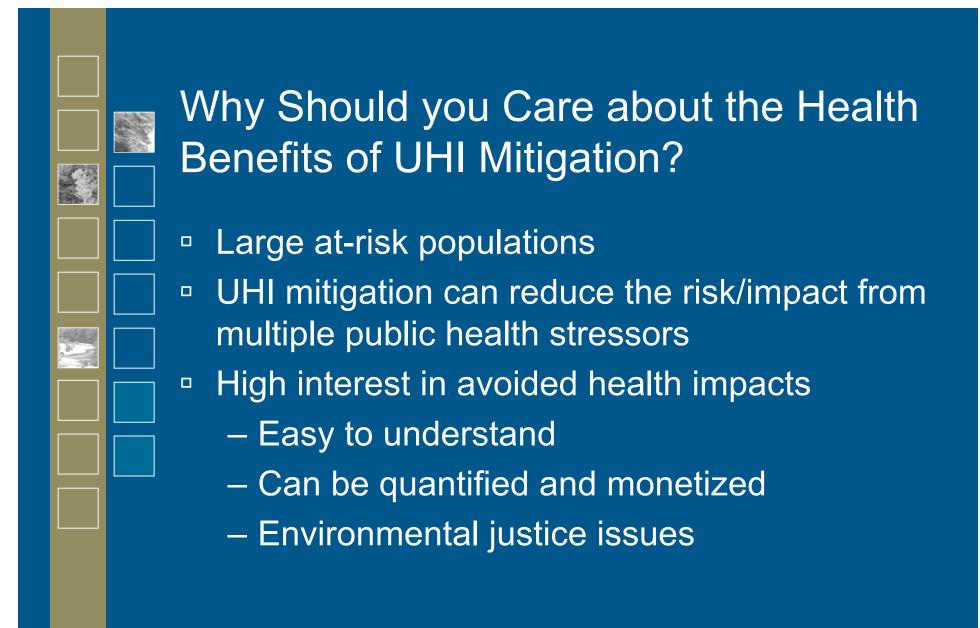
Health Benefits of Urban Heat Island Mitigation

Second International Conference on Countermeasures to Urban Heat Islands: Berkeley, CA September 21-23, 2009

Prepared by:
David Mills
Stratus Consulting
Boulder, CO
dmills@stratusconsulting.com

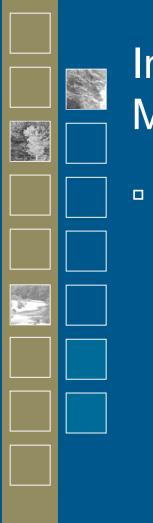




 Urban heat islands affect mortality and morbidity incidence

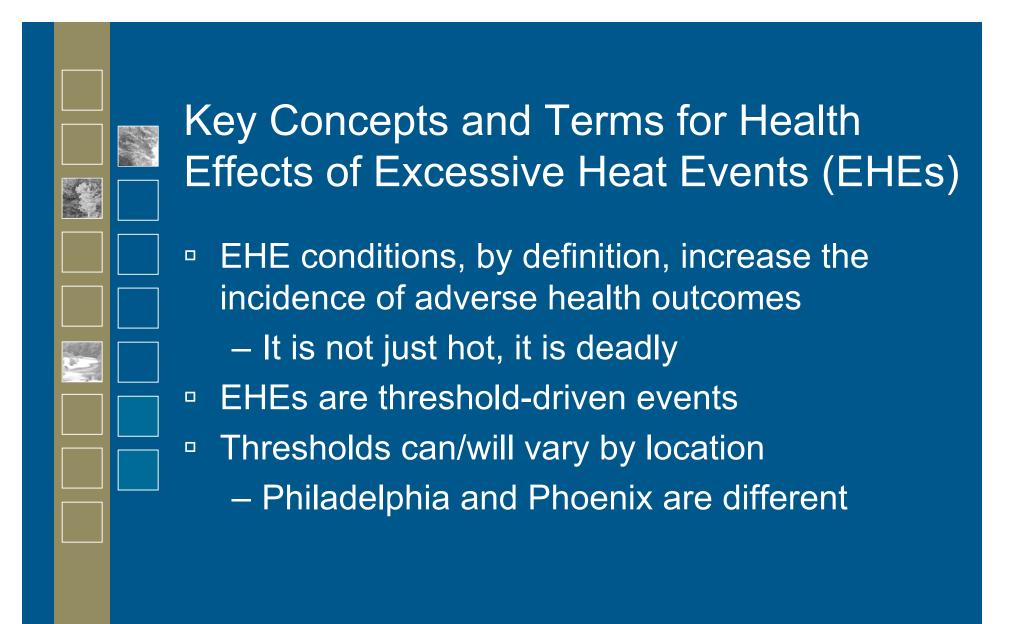






Indirect Health Benefits of UHI Mitigation

- Urban heat exacerbates other environmental health stressors
 - Air pollution concentrations:
 - precursor emissions
 - chemical reaction rates
 - Water pollution:
 - human exposure
 - presence/concentration of specific stressors (e.g., viruses, bacteria)



Typical Exposure-Response Calculation

Health impact of a stressor is estimated by:

$$\Delta y = y_0 \cdot \left(e^{\beta \cdot \Delta P} - 1 \right)$$

- Where:
 - $-\Delta y$ is the change in incidence
 - y₀ is the baseline incidence
 - β is the estimated health stressor effect
 - $-\Delta P$ is the change in stressor



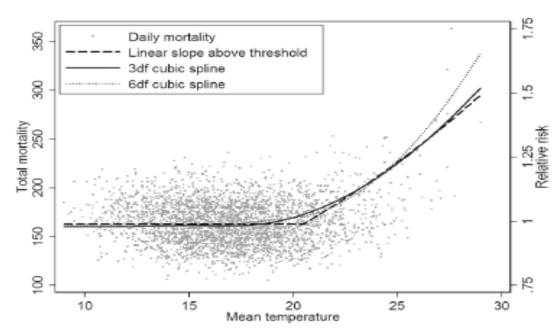
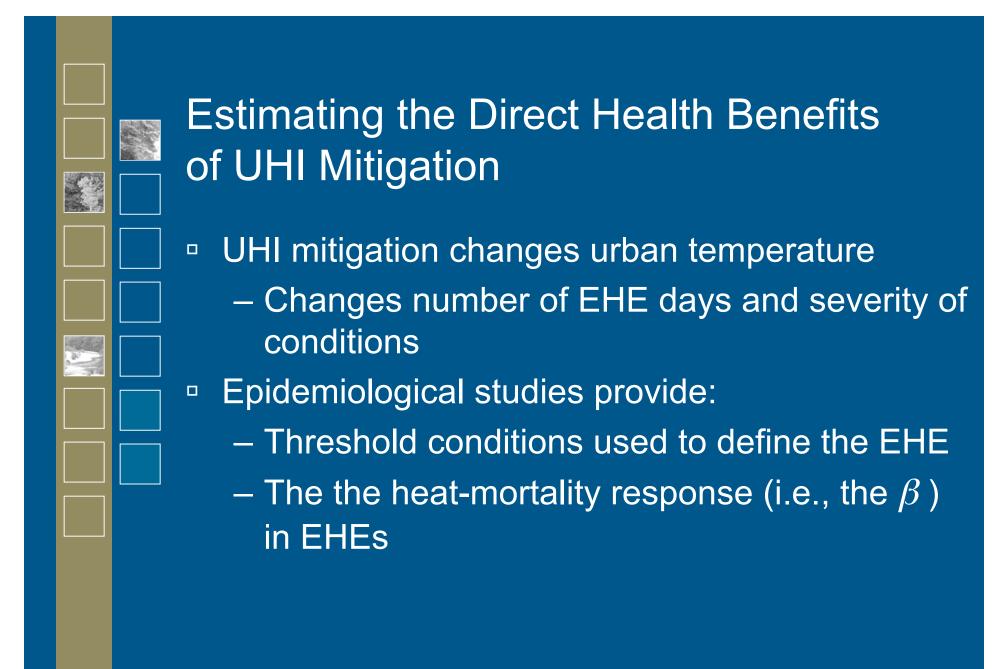
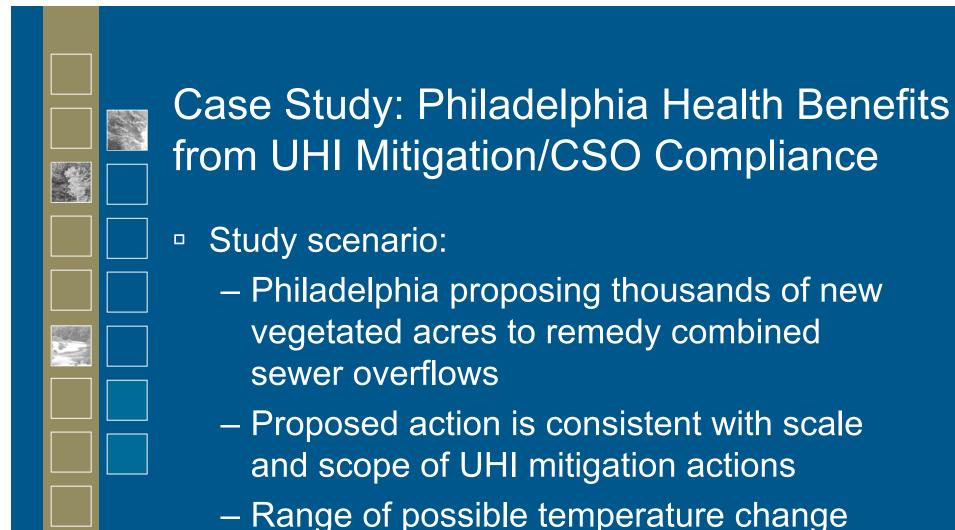


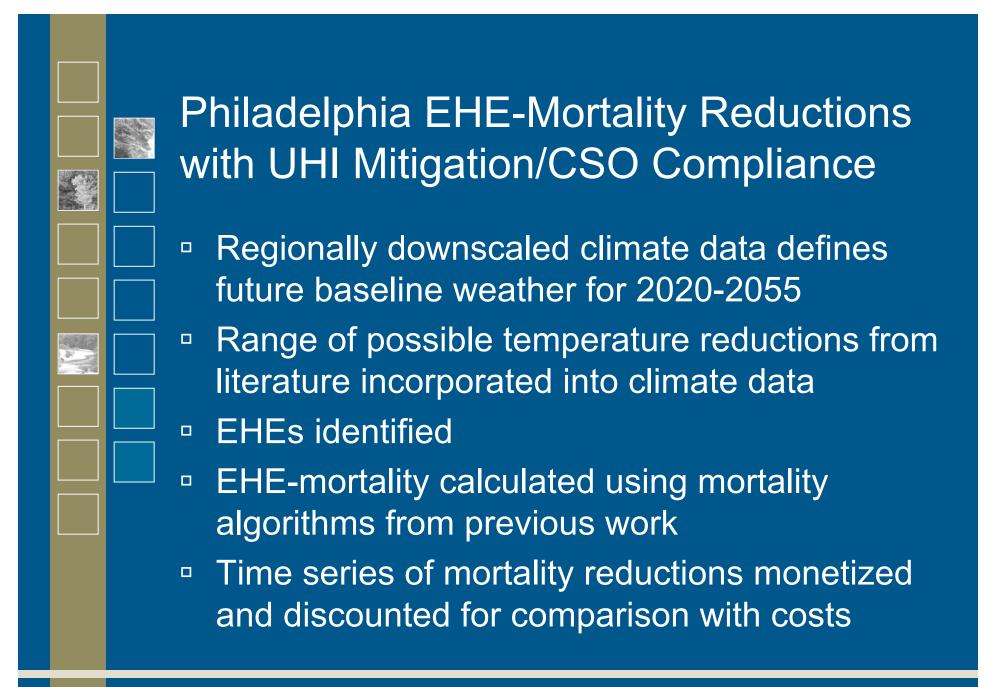
FIGURE 1. Relationship between mean temperature and relative risk of mortality (righthand axis) in London estimated using 3 model specifications. Dots represent individual observations of daily mortality (lefthand axis).

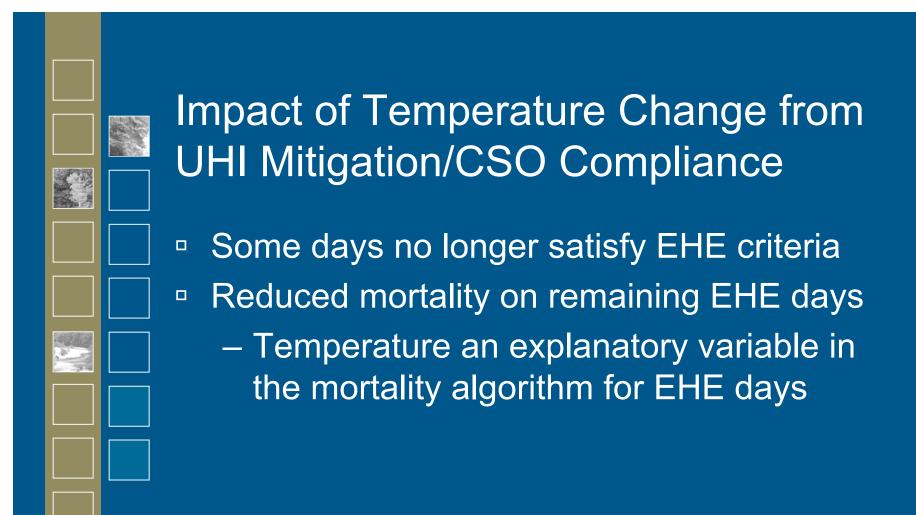
Source: Hajat et al., 2006





estimates from the literature



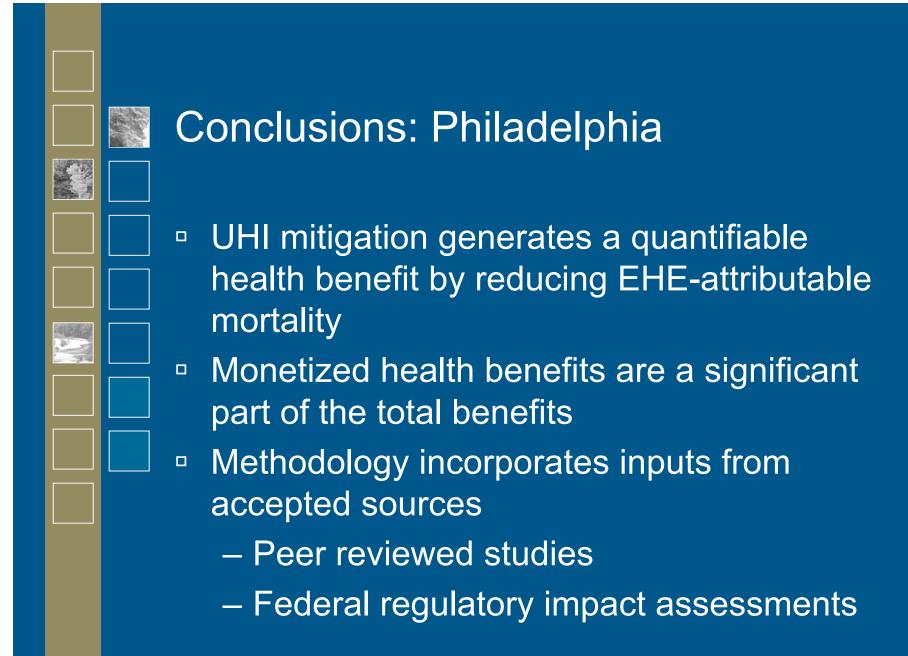


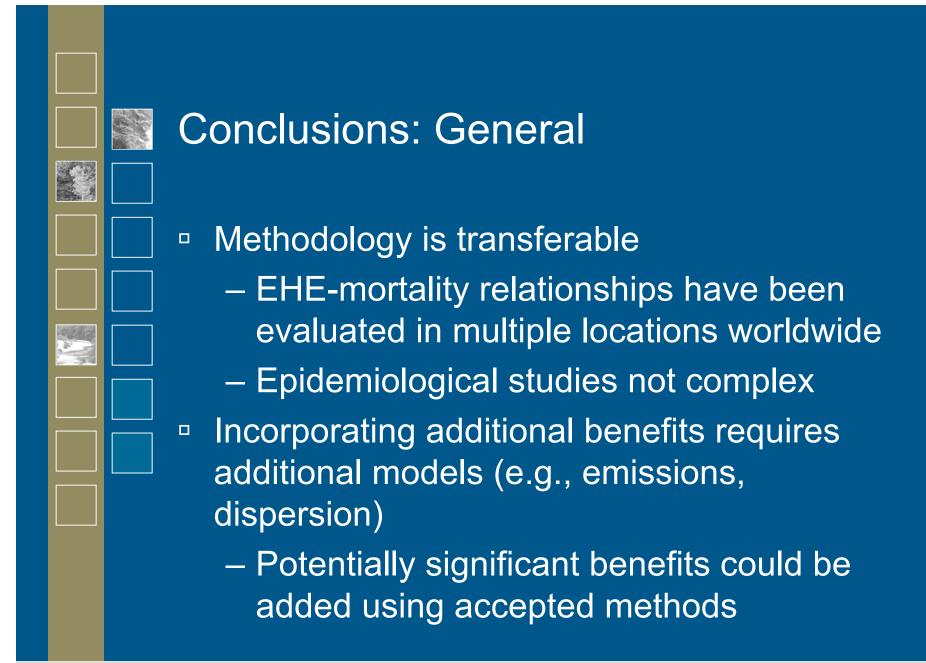
Mortality Results of UHI Mitigation in Philadelphia

				Temp	Temp
				reduction	reduction
Year	Control	Year	Control	0.25F	1.75F
1990	75	2020	90	85	66
1991	70	2021	50	47	34
1992	32	2022	52	48	36
1993	47	2023	155	150	122
1994	120	2024	128	122	105
1995	53	2025	61	55	43
1996	69	2026	98	95	74
1997	93	2027	86	83	63
1998	56	2028	54	49	41
1999	116	2029	117	105	83
2000	60	2030	47	45	33
ME A N	72	ME A N	85	80	64

Benefits of UHI Mitigation in Philadelphia

(2009 million USD)					
Benefit categories	50% LID option				
Increased recreational opportunities	\$524.5				
Improved aesthetics/property value (50%)	\$574.7				
Reduction in heat stress mortality	\$1,057.6				
Water quality/aquatic habitat enhancement	\$336.4				
Wetland services	\$1.6				
Social costs avoided by green collar jobs	\$124.9				
Air quality improvements from trees	\$131.0				
Energy savings/usage	\$33.7				
Reduced (increased) damage from SO ₂ and NO _x emissions	\$46.3				
Reduced (increased) damage from CO ₂ emissions	\$21.2				
Disruption costs from construction and maintenance	\$(5.6)				
Total	\$2,846.4				





Final Note: Locations and Populations Can Prepare for EHEs

